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The Silicon Vertex Detector of the Belle II Experiment

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The Belle experiment at the KEK-B electron/positron collider in Tsukuba (Japan) has been successfully operating for more than ten years. A major update of the machine to SuperKEKB is now foreseen until 2014, aiming a 40-fold peak luminosity compared to the previous system. This also requires a redesign of the Belle detector (leading to Belle II) and especially its Silicon Vertex Detector (SVD).

The future Belle II SVD will consist of four layers of double-sided silicon strip sensors (DSSD) entirely made from 6" wafers. Moreover, an inner double-layer pixel detector based on DEPFET technology will complement the SVD as innermost detector and the SVD itself will now contain a slanted forward part. The DSSDs are arranged in the so-called "Origami" chip-on-sensor concept to minimize material budget. This is complemented by a very lightweight mechanical support structure made from carbon fiber reinforced Airex foam and a CO_2 cooling system with extremely thin pipes.
Since the detector has to operate in an environment with high occupancy and continuous collisions, a hit-time-finding algorithm has been developed to narrow down the effective shaping time of the readout chips to a few nanoseconds.

In this talk, an overview of the Belle II SVD design will be given, covering the silicon sensors, the readout system and the lightweight support structures. A strong emphasis will be given to the status of prototype modules and its performance in recent beam tests.

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